CLAIMS

What is claimed is:

1.   A code division multiple access user equipment for use in receiving a plurality of data signals received over a shared spectrum, each received data signal experiencing a similar channel response, the user equipment comprising:

means for receiving a combined signal of the received data signals over the shared spectrum;

means for sampling the combined signal at a multiple of a chip rate of the data signals;

means for estimating a channel response for the combined signal at the multiple of the chip rate;

means for determining a cross correlation matrix using the estimated channel response;

means for selecting a subblock of the cross correlation matrix;

means for determining a Cholesky factor for the subblock;

means for extending the Cholesky factor;

means for determining the spread data vector using the extended Cholesky factor, a version of the channel response and the samples; and

means for estimating data of the data signals using the spread data vector.

2.   The user equipment of claim 1 wherein the channel response is estimated as a channel response matrix and the cross correlation matrix is the hermetian of the channel response matrix multiplied by the channel response matrix.

3.   The user equipment of claim 2 wherein the multiple is twice the chip rate sampling, the channel response matrix has even matrix samples H_1 and odd matrix samples H_2.

4.   The user equipment of claim 3 wherein the multiple is N-times the chip rate sampling, the channel response matrix has N sets of matrix samples, H_1, H_2, . . . H_N.

5.   The user equipment of claim 1 wherein the subblock has 2W - 1 by 2W - 1 elements of the cross correlation matrix and W is a length of the impulse response.

6.   The user equipment of claim 1 wherein the determining the spread data vector uses forward and backward substitution.

7.   A code division multiple access user equipment for use in receiving a plurality of data signals received over a shared spectrum, each received data signal experiencing a similar channel response, the user equipment comprising:

an antenna for receiving a combined signal of the received data signals over the shared spectrum;

a sampling device for sampling the combined signal at a multiple of a chip rate of the transmitted data signals;

a channel estimation device for estimating a channel response for the combined signal at the multiple of the chip rate; and

a single user detection device for determining a cross correlation matrix using the estimated channel response, for selecting a subblock of the cross correlation matrix, for determining a Cholesky factor for the subblock, for extending the Cholesky factor and for determining the spread data vector using the extended Cholesky factor, a version of the channel response and the samples; and

wherein data of the data signals is estimated from the spread data vector.

8.   The user equipment of claim 7 wherein the channel response is estimated as a

channel response matrix and the cross correlation matrix is the hermetian of the channel response matrix multiplied by the channel response matrix.

9. The user equipment of claim 8 wherein the multiple is twice the chip rate sampling, the channel response matrix has even matrix samples H_1 and odd matrix samples H_2.

10. The user equipment of claim 8 wherein the multiple is N-times the chip rate sampling, the channel response matrix has N sets of matrix samples, $H_1, H_2, \ldots H_N$.

11. The user equipment of claim 7 wherein the subblock has 2W - 1 by 2W - 1 elements of the cross correlation matrix and W is a length of the impulse response.

12. The user equipment of claim 7 wherein the determining the spread data vector uses forward and backward substitution.